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A Framework for MEPS Projections

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## Abstract

This report from the Agency for Healthcare Research and Quality (AHRQ) describes the procedures used to project data from the 1987 National Medical Expenditure Survey (NMES) household survey to future years. The 1987 NMES, sponsored by the National Center for Health Services Research, AHRQ's predecessor agency, provided extensive information on health expenditures by or on behalf of American families and individuals, the financing of these expenditures, and use of services. NMES data have been "aged" based on more recent household population estimates from government sources and data from the National Health Accounts of the Centers for Medicare & Medicaid Services. The NMES data were released in public use data sets projected to the years 1996 and 2005. This report describes the categories of expenditures and payment sources in the projected data, the population and expenditure reweighting procedures, and alignment of the 1987 NMES to the 1987 National Health Accounts.

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# The Medical Expenditure Panel Survey (MEPS)

## Background

The Medical Expenditure Panel Survey (MEPS) is conducted to provide nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage for the U.S. civilian noninstitutionalized population. MEPS also includes a nationally representative survey of nursing homes and their residents. MEPS is cosponsored by the Agency for Healthcare Research and Quality (AHRQ), formerly the Agency for Health Care Policy and Research, and the National Center for Health Statistics (NCHS).

MEPS comprises four component surveys: the Household Component (HC), the Medical Provider Component (MPC), the Insurance Component (IC), and the Nursing Home Component (NHC). The HC is the core survey, and it forms the basis for the MPC sample and part of the IC sample. The separate NHC sample supplements the other MEPS components. Together these surveys yield comprehensive data that provide national estimates of the level and distribution of health care use and expenditures, support health services research, and can be used to assess health care policy implications.

MEPS is the third in a series of national probability surveys conducted by AHRQ on the financing and use of medical care in the United States. The National Medical Care Expenditure Survey (NMCES) was conducted in 1977, the National Medical Expenditure Survey (NMES) in 1987. Beginning in 1996, MEPS continues this series with design enhancements and efficiencies that provide a more current data resource to capture the changing dynamics of the health care delivery and insurance system.

The design efficiencies incorporated into MEPS are in accordance with the Department of Health and Human Services (DHHS) Survey Integration Plan of June 1995, which focused on consolidating DHHS surveys, achieving cost efficiencies, reducing respondent burden, and enhancing analytical capacities. To accommodate these goals, new MEPS design features include linkage with the National Health Interview Survey (NHIS), from which the sample for the MEPS HC is drawn, and enhanced longitudinal data collection for core survey components. The MEPS HC augments NHIS by selecting a sample of NHIS respondents, collecting additional data on their health care expenditures, and linking these data with additional information collected from the respondents' medical providers, employers, and insurance providers.

## Household Component

The MEPS HC, a nationally representative survey of the U.S. civilian noninstitutionalized population, collects medical expenditure data at both the person and household levels. The HC collects detailed data on demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income, and employment.

The HC uses an overlapping panel design in which data are collected through a preliminary contact followed by a series of five rounds of interviews over a 2½-year period. Using computer-assisted personal interviewing (CAPI) technology, data on medical expenditures and use for 2 calendar years are collected from each household. This series of data collection rounds is launched each subsequent year on a new sample of households to provide overlapping panels of survey data and, when combined with other ongoing panels, will provide continuous and current estimates of health care expenditures.

The sampling frame for the MEPS HC is drawn from respondents to NHIS, conducted by NCHS. NHIS provides a nationally representative sample of the U.S. civilian noninstitutionalized population, with oversampling of Hispanics and blacks.

## Medical Provider Component

The MEPS MPC supplements and validates information on medical care events reported in the MEPS HC by contacting medical providers and pharmacies identified by household respondents. The MPC sample includes all hospitals, hospital physicians, home health agencies, and pharmacies reported in the HC. Also included in the MPC are all office-based physicians:

• Providing care for HC respondents receiving Medicaid.

- Associated with a 75-percent sample of households receiving care through an HMO (health maintenance organization) or managed care plan.
- Associated with a 25-percent sample of the remaining households.

Data are collected on medical and financial characteristics of medical and pharmacy events reported by HC respondents, including:

- Diagnoses coded according to ICD-9 (9th Revision, International Classification of Diseases) and DSM-IV (Fourth Edition, *Diagnostic and Statistical Manual of Mental Disorders*).
- Physician procedure codes classified by CPT-4 (Current Procedural Terminology, Version 4).
- Inpatient stay codes classified by DRG (diagnosis-related group).
- Prescriptions coded by national drug code (NDC), medication names, strength, and quantity dispensed.
- Charges, payments, and the reasons for any difference between charges and payments.

The MPC is conducted through telephone interviews and mailed survey materials.

## Insurance Component

The MEPS IC collects data on health insurance plans obtained through private and public-sector employers. Data obtained in the IC include the number and types of private insurance plans offered, benefits associated with these plans, premiums, contributions by employers and employees, and employer characteristics.

Establishments participating in the MEPS IC are selected through three sampling frames:

- A list of employers or other insurance providers identified by MEPS HC respondents who report having private health insurance at the Round 1 interview.
- A Bureau of the Census list frame of private-sector business establishments.
- The Census of Governments from the Bureau of the Census.

To provide an integrated picture of health insurance, data collected from the first sampling frame (employers and other insurance providers) are linked back to data provided by the MEPS HC respondents. Data from the other three sampling frames are collected to provide annual national and State estimates of the supply of private health insurance available to American workers

and to evaluate policy issues pertaining to health insurance. Beginning in 2000, national estimates of employer contributions to group health insurance from the MEPS IC are being used in the computation of Gross Domestic Product (GDP) by the Bureau of Economic Analysis.

The MEPS IC is an annual panel survey. Data are collected from the selected organizations through a prescreening telephone interview, a mailed questionnaire, and a telephone followup for nonrespondents.

## Nursing Home Component

The 1996 MEPS NHC was a survey of nursing homes and persons residing in or admitted to nursing homes at any time during calendar year 1996. The NHC gathered information on the demographic characteristics, residence history, health and functional status, use of services, use of prescription medications, and health care expenditures of nursing home residents. Nursing home administrators and designated staff also provided information on facility size, ownership, certification status, services provided, revenues and expenses, and other facility characteristics. Data on the income, assets, family relationships, and caregiving services for sampled nursing home residents were obtained from next-of-kin or other knowledgeable persons in the community.

The 1996 MEPS NHC sample was selected using a two-stage stratified probability design. In the first stage, facilities were selected; in the second stage, facility residents were sampled, selecting both persons in residence on January 1, 1996, and those admitted during the period January 1 through December 31.

The sampling frame for facilities was derived from the National Health Provider Inventory, which is updated periodically by NCHS. The MEPS NHC data were collected in person in three rounds of data collection over a $1\frac{1}{2}$-year period using the CAPI system. Community data were collected by telephone using computer-assisted telephone interviewing (CATI) technology. At the end of three rounds of data collection, the sample consisted of 815 responding facilities, 3,209 residents in the facility on January 1, and 2,690 eligible residents admitted during 1996.

## Survey Management

MEPS data are collected under the authority of the Public Health Service Act. They are edited and published in accordance with the confidentiality provisions of this act and the Privacy Act. NCHS provides consultation and technical assistance.

As soon as data collection and editing are completed, the MEPS survey data are released to the public in staged releases of summary reports and microdata files. Summary reports are released as printed documents and electronic files. Microdata files are released on CD-ROM and/or as electronic files.

Printed documents and CD-ROMs are available through the AHRQ Publications Clearinghouse. Write or call:

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Additional information on MEPS is available from the MEPS project manager or the MEPS public use data manager at the Center for Cost and Financing Studies, Agency for Healthcare Research and Quality, 2101 East Jefferson Street, Suite 500, Rockville, MD 20852 (301-594-1406).

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# Projecting National Medical Expenditure Survey Data: A Framework for MEPS Projections

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## Introduction

This report describes the procedure used to project data from the 1987 National Medical Expenditure Survey (NMES) household survey to future years. The 1987 NMES provided extensive information on health expenditures by or on behalf of American families and individuals, the financing of these expenditures, and use of services. The 1987 NMES Household Survey was based on a national probability sample of the civilian noninstitutionalized population. The sample was designed to provide a larger representation of population groups of interest to the Federal Government than would have been obtained from a random sample. These groups included poor and low-income families, the elderly, the functionally impaired, blacks, and Hispanics. The 1987 NMES was sponsored by the National Center for Health Services Research, the predecessor to the Agency for Healthcare Research and Quality (AHRQ). More information on the 1987 NMES can be found in Edwards and Berlin (1989).

NMES data were released in public use data sets projected to the years 1996 and 2005. The projected data files consisted of person-level records, each of which included personal health expenditure variables by type of service and payment source, as well as demographic and insurance characteristics, and a weight that could be used to produce national totals for the civilian noninstitutionalized population.

Each projected data set was a person-level ASCII data file. Each file was a sample of 34,175 people, had one record for each person, and was designed to provide estimates that were representative of the civilian noninstitutionalized population of the United States in the designated year. Projected data files cannot be linked to other NMES or MEPS data files that were not projected. This prohibits analysts from making projections for population groups that were not statistically controlled for in the aging process.

Person-level records from NMES were reweighted based on more recent household population estimates from government sources to project the household population. Household health expenditures by type of service and payment source for the reweighted population were then aligned to adjusted National Health Accounts (NHA) data from the Centers for Medicare & Medicaid Services (CMS), formerly called the Health Care Financing Administration (HCFA), or to adjusted NHA projections from the Congressional Budget Office to complete the aging of the health expenditure data.

This report first describes the 16 categories of expenditures and the 9 categories of payment sources in the projected data. This section is followed by a discussion of the reweighting procedure that projects the household population to future years. The next two sections describe the alignment of the reweighted expenditure data to adjusted NHA data by type of expenditure and payment source. This alignment captured inflationary growth in expenditures, as well as any real changes not otherwise accounted for by the population aging, in addition to any remaining inherent differences between NMES and the NHA after adjusting the NHA data. The final section illustrates the alignment of the 1987 NMES to the 1987 NHA using the method described in the previous sections. By removing the population reweighting step, this contemporaneous alignment highlights the differences between NHA and NMES estimates of National Health Expenditures in 1987 by service type and payment source.

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[1]Formerly with the Agency for Healthcare Research and Quality.

[2]Formerly with Social and Scientific Systems, Inc.

# Medical Expenditure and Payment Source Categories

Detailed expenditure data from NMES were compiled and projected for 16 different medical service categories plus a total expenditure category, as defined below.

1. *Hospital room and board expenditures*: [hospital facility expense][3] + [(0.7)hospital expense for admissions without an overnight stay][4]

2. *Inpatient physician expenditures*: [hospital physician expense] + [(0.3)hospital expense for admissions without an overnight stay][4]

3. *Emergency room expenditures*: [expense for emergency room visits not resulting in hospital admissions] + [expense for emergency room visits resulting in hospital admissions]

4. *Physician office expenditures*: [expense for physician visits excluding hospital and home health] + [expense for home health visits by a physician] + [expense for hospital outpatient visits by a physician] + [expense for hospital outpatient visits by a nurse] + [expense for hospital outpatient visits by a technician] + [expense for outpatient visits by a physician's assistant] + [expense for phone visits with a non-hospital-based physician] + [expense for phone visits with a non-hospital-based nonphysician] + [expense for other providers working for physician (excluding hospital and home health)] – [expense for visits for outpatient psychiatric care by a physician]

5. *Outpatient hospital expenditures (excluding mental health and chiropractic services)*: [expense for hospital outpatient visits to a physical therapist] + [expense for hospital outpatient visits to a social worker] + [expense for visits to other providers not working for a physician (excluding visits in hospital or in home)] + [expense for hospital outpatient visits to other medical professionals]

6. *Chiropractor expenditures (ambulatory plus outpatient)*: [expense for chiropractor visits (excluding visits in hospital or in home)] + [expense for hospital outpatient visits by a chiropractor]

7. *Podiatrist expenditures (ambulatory plus outpatient)*: [expense for podiatrist visits (excluding visits in hospital or in home)] + [expense for hospital outpatient visits by a podiatrist]

8. *Optometrist expenditures (ambulatory plus outpatient)*: [expense for optometrist visits (excluding visits in hospital or in home)] + [expense for hospital outpatient visits by an optometrist]

9. *Outpatient mental health (ambulatory and hospital outpatient)*: [expense for visits for outpatient psychiatric care by a physician] + [expense for psychologist visits (excluding visits in hospital or in home)] + [expense for hospital outpatient visits by a psychologist]

10. *Prescription drug expenditures*: [expense for prescribed medicines (including refills)]

11. *Orthodontia expenditures*: [expense for orthodontic dental visits]

12. *Other dental expenditures*: [expense for nonorthodontic dental visits]

13. *Glasses and contact lenses*: [expense for vision aids]

14. *Durable medical equipment*: [expense for durable medical goods (excluding vision)]

15. *Nondurable medical supplies*: [expense for nondurable medical goods]

16. *Home health*: [expense for home health visits by a nonphysician medical professional] + [expense for home health visits by a nonmedical professional]

- *Total personal heath care expenditures:* [the sum of the 16 separate expenditure categories]

The expenditures in each of the expenditure categories were divided into nine sources of payment (and a total). These payment source categories are listed below.

1. *Self or family (out of pocket)*

2. *Private health insurance*

3. *Medicare*

4. *Medicaid*

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[3]Includes physician expenses for services billed by the facility.

[4]Hospital facility and physician expenses were not reported separately for admissions without an overnight stay, so we assumed the 0.7/0.3 allocation between categories 1 and 2 that approximates the split between the two categories without this component.

5. *Other Federal sources*: [includes CHAMPUS and CHAMPVA (Armed-Forces-related coverage), Supplemental Security Income (SSI), Indian Health Service facility or contract, Intertribal Council, Alaska Native Corporation, Department of Veterans Affairs, and any other military or Federal program (such as free government screening services and care at the National Institutes of Health)]

6. *Other State and local sources*: [includes services such as community health centers, but excludes local and State employment-related insurance and means-tested programs]

7. *Workers' compensation*

8. *Other private sources*: [includes automobile insurance, other kinds of insurance not specified, company (where company is not the respondent's insurer or employer), school (where school is not the respondent's insurer or employer), union (where union is not the respondent's insurer or employer), friend, foreign government, and not otherwise specified]

9. *Free from provider*

- *Total personal health expenditures from all payment sources*

When using the expenditures reported under the "free from provider" category, keep in mind that there is a "double counting" issue. To the extent that "free care" is financed through higher fees charged to patients paying through insurance or out of pocket, including imputed dollar values for "free from provider" as a source of payment counts some health care spending twice. However, some services rendered free from provider are financed by philanthropy or sources of nonpatient revenue (such as parking fees at a hospital). Therefore, to obtain an accurate value, some "payments" called "free from provider" should be included in total expenditures. Unfortunately, the monies from philanthropy and nonpatient sources could not be separated from the other "free from provider" expenditures. When projecting the data, the total expenditure values in each of the service categories include the imputed "free from provider" values, so there is some double counting in the totals. Options available to analysts are to use the total values or to subtract the "free from provider" expenditures (or some portion thereof) from the totals and use those results as totals.

## Household Population Aging

The person-level sample weight for each person record in the projected data files is used to produce national estimates for the civilian noninstitutionalized population of the United States in a designated year. The weight for the designated year was based on the original NMES 1987 weight (which took into account survey design and nonresponse) and was then adjusted in two steps (Cohen, DiGaetano, and Waksberg, 1991). Both steps employed a cell-based weighting-class procedure to capture changes in the U.S. population from 1987 to the designated year. The first step was a series of post-stratifications designed to update the 1987 data to 1996 on a broad array of demographic, income, and health care dimensions. In the second step, the 1996 data were projected to later years based on Middle Series Census Bureau estimates of growth in the population by age, race/ethnicity, and sex (Bureau of the Census, 1992). Both steps are detailed below.

The NMES weight was first adjusted to represent the 1996 U.S. population by using the March 1997 Current Population Survey (CPS). In this process, records from both NMES and the CPS were partitioned into matrices defined by the following set of person characteristics: (1) receipt of means-tested cash assistance, (2) age, (3) race, (4) sex, (5) family income relative to the poverty line, (6) primary source of health insurance, (7) employment status of the family head, and (8) region. Details for each of these and other stratifying variables used in the population reweighting are provided in Appendix A.

To assure that the minimum sample size was met in each partitioned cell while maximizing the disaggregation of the data, an automated cell collapsing software product was developed for this purpose by a contractor, Social and Scientific Systems, Inc. Each NMES weight in a given cell was then multiplied by the ratio of the sum of the CPS weights to the sum of the NMES weights for that cell. This weight was then adjusted so that the number of persons in each Census region for the projected data (for 1996) reporting participation in Aid to Families with Dependent Children (AFDC), SSI, or other Medicaid (persons on AFDC or SSI receive Medicaid coverage) on the reweighted NMES matched the number of recipients of these benefits according to an adjusted figure from 1996 administrative records. This was done to compensate for the underreporting of these benefits in the CPS.

Increased enrollment in health maintenance organizations (HMOs) since 1987 also needed to be captured. To do so, the NMES population under age 65 with private coverage was reweighted within population cells to the 1995 National Health Interview Survey (NHIS) distribution of non-elderly persons with private coverage enrolled in HMOs. NMES was first partitioned into matrices using the automated cell collapsing software and the same eight person-level characteristics used in the first reweighting (described above) plus an indicator of HMO participation. The weight for individuals in each cell of these matrices was adjusted to match HMO enrollment for the privately insured population under age 65 as reported in the 1995 NHIS. In both NMES and NHIS, an HMO was defined as either a group or staff model prepaid health plan or an independent practice association (IPA). The weights for persons outside this targeted population were not adjusted.

The proportions of the population with Medicare who had no other insurance, who had other employment-based insurance, and who had other individually purchased insurance coverage on the reweighted NMES file did not match data from the Medicare Current Beneficiary Survey (MCBS) for calendar year 1994. On the assumption that the MCBS provides a more accurate representation of this population than the CPS does, weights for these people were adjusted so that the proportions with Medicare only, Medicare and employer-provided insurance, and Medicare and individually purchased insurance matched the proportions found on the MCBS. No adjustment was made to the weights for those outside this population.

An additional minor adjustment to the weight was necessary because the population statistics used to create the initial 1996 sample weight were based on the March 1997 CPS. To account for population change that occurred from 1996 to early 1997, Census data on age and sex population characteristics for December 1996 were used. This last adjustment created the final version of the 1996 sample weight.[5]

The 1996 sample weight was projected to the years 1997-2005 by using population projections from the Census Bureau based on age, race/ethnicity, and sex to create the weights for those years.[6] Initially, for each of the 60 population cells defined by age (0-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over), race/ethnicity (Hispanic, black non-Hispanic, other), and sex, population growth rates for each year from 1997 through 2005 were constructed as the ratio of the Census projections for the specified year divided by the Census data for 1996 for the same cell. Next, the 1996 sample weight for every person within each of the 60 age, race/ethnicity, and sex cells was multiplied by the cell-specific population growth rate from the Census projections for each year. This produced the weights for each year from 1997 through 2005.

One caveat when using these projected data sets and the weights included on each file concerns HMO coverage. Only the population under age 65 with private coverage was included in the post-stratification to account for increased HMO coverage. There were too few persons age 65 and over with HMO coverage in the original 1987 data to post-stratify this population. Therefore, it is possible to obtain an estimate only of the total number of people under age 65 with private HMO coverage.

A second caveat when using the weights on the projected data files concerns obtaining totals for certain populations with a particular set of characteristics. Some of the cells in the reweighting matrices had a very small number of observations, so estimates based on those cells are unreliable. This is a particularly pertinent issue for the population receiving means-tested cash assistance (such as AFDC and SSI). The population was split into two groups based on receipt of means-tested cash assistance. However, the number of people with cash assistance was too small to make estimates. To remedy this problem, a minimum cell size of 20 records for each cell was initially established, but it had to be lowered to 10 records in some instances. As a result, some cells were collapsed along one or more variables. For example, 10 age categories were generally used in

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[5]The population contributing to annual health expenditures at any time during 1996 is slightly underestimated by the cross-sectional weighting of the population. A correction for this was made in future revisions to the methodology as applied to Medical Expenditure Panel Survey (MEPS) expenditure projections.

[6]The population reweighting technique was not updated with more recent CPS files because the projection methodology was revised after converting from a NMES to a MEPS database. The projected MEPS data sets are now available on the MEPS Web site at <http://www.meps.ahrq.gov/MEPSDATA/Projected/mepsdata.htm>.

the creation of the weight for people without cash assistance; however, the 10 age categories were collapsed to 3 in a separate age variable for people with cash assistance (Appendix A).

It is also important to note that the projected data sets do not include demographic and insurance characteristics other than those of the household population used for the reweighting. Without controls for these other variables in the population aging, there would be no sound basis for projecting them to future years.

## Aligning Health Service Type and Payment Source Categories

To complete the aging of the NMES expenditure values, the reweighted NMES expenditure data had to be aligned to adjusted 1996 NHA data from CMS and to projections of adjusted NHA data from the Congressional Budget Office (CBO) for each year from 1997 through 2005 (Congressional Budget Office, 1995).[7] This alignment was implemented by type of health care service and, within service class, by payment source. The first step in the alignment was to construct health service and payment source categories that were comparable between NMES and the NHA.

NMES identifies more categories of health services than the NHA, so the alignment process required combining several NMES health service types into a smaller number of categories consistent with those reported in NHA. To construct the alignment factors, 16 NMES health service categories were collapsed into 7 categories common to the NHA (Table 1). Two additional NHA health expenditure categories

[7]At the time the projected NMES data were developed, only CBO projections beyond 1996 were available by type of service and payment source. (Projected MEPS data are based on more recent NHA estimates and projections from CMS.) CBO projections for 1996 through 2005 were scaled downward by the ratio of actual 1996 NHA data by service type and payment source from CMS to CBO projections for 1996. More recently, CBO has updated its projections on the basis of a lower growth assumption, but these projections do not disaggregate NHA by type of medical service category because of the difficulty in distinguishing types of services in the present-day health care sector, which is dominated by managed care.

**Table 1. NMES Household Survey expenditure catagories and corresponding NHA expenditure categories**

| NMES expenditure category and number(s) | NHA expenditure category | Collapsed category number |
| --- | --- | --- |
| Outpatient, facility (1) | Hospital | 1 |
| Emergency room (3) | Hospital | 1 |
| Inpatient, facility (1) | Hospital | 1 |
| Outpatient, physician (4, 9) | Physician | 2 |
| Physician office visits (4) | Physician | 2 |
| Physician phone calls (4) | Physician | 2 |
| Inpatient, physician (2) | Physician | 2 |
| Physician home visits (4) | Physician | 2 |
| Dental visits (11, 12) | Dental | 3 |
| Outpatient, nonphysician (5-9) | Other professional | 4 |
| Nonphysician office (5-9) | Other professional | 4 |
| Nonphysician phone (5-9) | Other professional | 4 |
| Home health care (16) | Home health | 5 |
| Prescribed drugs (10) | Drugs and nondurables | 6 |
| Nondurable medical goods (15) | Drugs and nondurables | 6 |
| Durable medical goods (14) | Durable medical goods | 7 |
| Eyeglasses, contact lenses (13) | Durable medical goods | 7 |
| No NMES equivalent | Nursing home | 8 |
| No NMES equivalent | Other personal health | 9 |
| Total expenditures | Total personal health | — |

**Note:** MEPS is the Medical Expenditure Panel Survey. NMES is the National Medical Expenditure Survey. NHA is the National Health Accounts of the Centers for Medicare and Medicaid Services (formerly the Health Care Financing Administration). The NMES expenditure categories are from NMES expenditure data previously released on Public Use Tape 18 (Agency for Health Care Policy and Research, 1993). This table represents a reconfiguration of the 16 expenditure categories described in the text. Numbers in parentheses in the first column refer to numbers of the expenditure variables in the list in the text.
**Source:** Center for Cost and Financing Studies, Agency for Healthcare Research and Quality.

listed in Table 1 (nursing home and other personal health) covered expenditures outside the scope of NMES.

The 16 NMES expenditure categories in Table 1, and a 17th category for total health expenditures, were constructed directly from NMES Public Use Tape 18 (Agency for Health Care Policy and Research, 1993). Analysts cannot replicate the creation of the alignment factors for a given year from the projected data because the projected data sets cannot be linked to Public Use Tape 18.

As with type of service, there are different sources of payment in NMES than in the NHA. NMES has nine payment source categories, excluding the total category, which were defined earlier and are listed in the first column of Table 2. The NHA has 21 source of payment categories, which are listed below:

Private funds
    Out-of-pocket payments
    Private health insurance
    Other private funds
        Industrial inplant
        Nonpatient revenues
Public funds
    Federal funds
        Medicare
        Workers' compensation
        Medicaid (Federal)
        Department of Defense
        Maternal and Child Health
        Department of Veterans Affairs
        Vocational rehabilitation
        General hospital/medical, not elsewhere
          classifiable
        Alcohol, Drug Abuse, and Mental Health
          Administration/Substance Abuse and Mental
          Health Services Administration
        Indian Health Service
    State and local funds
        Temporary disability
        Workers' compensation
        Public assistance
          Medicaid (State/local)
          General Assistance
        Maternal and Child Health
        Vocational rehabilitation
        State and local hospital and school health

## Table 2. NMES Household Survey payment source categories and corresponding NHA payment source categories

| NMES payment source category and number | NHA payment source category | Collapsed category number |
|---|---|---|
| Self or family (1) | Out of pocket | 1 |
| Private insurance (2) | Private insurance | 2 |
| Medicare (3) | Medicare | 3 |
| Medicaid (4) | Medicaid[a] | 4 |
| Other Federal (5) | Other Federal | 5 |
| Other State (6) | Other State | 5 |
| Workers' compensation (7) | No NHA equivalent[b] | 5 |
| Other private (8) | No NHA equivalent[c] | 1, 2 |
| Free from provider (9) | Other private source[d] | — |

[a]Combines the NHA Federal and State/local Medicaid payment source categories.

[b]Health expenditures under workers' compensation consist of medical benefits paid under public law by private insurance carriers and self-insured firms. They are treated as public expenditures in the NHA.

[c]Other private expenditures from NMES were allocated between self/family and private health insurance to construct alignment factors in order to match their treatment in NHA.

[d]"Free from provider" expenditures from NMES and "other private" expenditures from the NHA were subtracted from their respective totals to construct the alignment factors because neither represents direct payment for patient services.

**Note:** MEPS is the Medical Expenditure Panel Survey. NMES is the National Medical Expenditure Survey. NHA is the National Health Accounts of the Centers for Medicare and Medicaid Services (formerly the Health Care Financing Administration). The NMES payment source categories are from NMES data previously released on Public Use Tape 18 (Agency for Health Care Policy and Research, 1993). This table represents a reconfiguration of the 9 payment source categories described in the text. Numbers in parentheses in the first column refer to numbers of the payment source variables in the list in the text.

**Source:** Center for Cost and Financing Studies, Agency for Healthcare Research and Quality.

The NHA Medicaid category in the second column of Table 2 was constructed by combining the Federal and State/local Medicaid categories listed above. The "other Federal" NHA category in the second column of Table 2 was constructed by combining all of the NHA Federal funds sources listed above except Medicare and Medicaid (Federal). The "other State" NHA category in the second column of Table 2 contains all of the components of the NHA State and local funds sources listed above except for Medicaid (State/local). For the alignment, the other Federal and other State/local categories were combined into a single "other government" category (third column of Table 2).

After the NMES expenditures were constructed by collapsed service category, shown in Table 1, they were further partitioned by collapsed payment source category (within each service category), shown in Table 2. This produced a matrix of six expenditure categories by five payment source categories. (The categories for physicians and for other health professionals shown in Table 1 were combined into a single category to reduce the number of service categories from seven to six.)

**Figure 1. Reconciling National Health Expenditures for 1996 from NHA and from projected NMES household data [In billions of dollars]**

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**1. National Health Accounts**

National Health Expenditures = $1,035.1[a]

*Minus:*

Program administration, insurance loading, etc. = $60.9
Government public health activities = $35.5
Research and construction = $31.5
Nursing home care = $78.5
Other personal health care = $27.6
Subtotal = $234.0

Net National Health Expenditures = $801.1

**2. Aged NMES data for 1996, aligned to adjusted NHA net National Health Expenditures**

Aligned NMES National Expenditure total (excluding free from provider) = $649.8
Subtractions from NHA net National Health Expenditures = $151.3

**3. Understanding the Subtractions from NHA net National Health Expenditures**

Nursing home resident hospitalization, physician services, etc. (acute care) = $47.6 ($21,600 per person)

Noncommunity hospitals and nonpatient revenues in community hospitals = $53.6 (14.9 percent of NHA hospitalization)

Total other private nonpatient revenues from other services = $11.5
Physician = $4.2
Dental = $0.2
Other professional = $3.8
Home health = $3.3

Total nondurables = $29.4

Differences in populations (CPS is smaller) = $9.2

Subtotal of itemized subtractions = $151.3

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[a]Levit, Lazenby, Braden, et al., 1998.
**Note:** CPS is the Current Population Survey, sponsored by the Census Bureau. NMES is the National Medical Expenditure Survey. NHA is the National Health Accounts of the Centers for Medicare and Medicaid Services (formerly the Health Care Financing Administration).
**Source:** Center for Cost and Financing Studies, Agency for Healthcare Research and Quality.

## Table 3. 1987 NMES expenditures (in billions of dollars) calibrated to adjusted NHA, uncalibrated, and ratio of calibrated to uncalibrated

| Type of service and type of value | | Source of payment[a] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Out of pocket | Private insurance | Medicare | Medicaid | Other government | Total |
| | | **Billions of dollars** | | | | | |
| Hospital | Cal | 8.586 | 68.064 | 36.855 | 12.992 | 23.820 | 150.318 |
| | Uncal | 15.301 | 68.129 | 44.350 | 15.249 | 18.860 | 161.889 |
| | Cal factor | 0.561 | 0.999 | 0.831 | 0.852 | 1.263 | 0.929 |
| Physicians | Cal | 38.608 | 48.732 | 17.959 | 4.611 | 5.990 | 115.899 |
| and other | Uncal | 31.872 | 49.415 | 18.775 | 9.183 | 15.990 | 125.235 |
| professionals | Cal factor | 1.211 | 0.986 | 0.957 | 0.502 | 0.375 | 0.925 |
| Dental | Cal | 13.014 | 11.358 | 0.000 | 0.532 | 0.134 | 25.038 |
| | Uncal | 16.858 | 10.430 | 0.025 | 0.543 | 0.503 | 28.359 |
| | Cal factor | 0.772 | 1.089 | 0.000 | 0.980 | 0.266 | 0.883 |
| Home health | Cal | 1.798 | 1.096 | 1.403 | 1.676 | 0.026 | 5.999 |
| | Uncal | 4.898 | 1.272 | 2.178 | 2.813 | 0.131 | 11.292 |
| | Cal factor | 0.367 | 0.862 | 0.644 | 0.596 | 0.201 | 0.531 |
| Drugs and | Cal | 13.385 | 7.589 | 0.000 | 3.056 | 0.759 | 24.789 |
| nondurables | Uncal | 13.372 | 6.698 | 0.289 | 2.257 | 1.291 | 23.907 |
| | Cal factor | 1.001 | 1.133 | 0.000 | 1.354 | 0.588 | 1.037 |
| Durables | Cal | 5.404 | 0.817 | 1.187 | 0.000 | 0.165 | 7.574 |
| | Uncal | 5.509 | 0.775 | 0.341 | 0.215 | 0.079 | 6.919 |
| | Cal factor | 0.981 | 1.054 | 3.477 | 0.000 | 2.095 | 1.095 |
| Total | Cal | 81.489 | 136.953 | 57.400 | 22.845 | 30.894 | 329.583 |
| | Uncal | 88.460 | 136.070 | 65.959 | 30.259 | 36.854 | 357.601 |
| | Cal factor | 0.921 | 1.006 | 0.870 | 0.755 | 0.838 | 0.922 |

[a]Excludes services free from provider.

**Note:** NMES is the National Medical Expenditure Survey. NHA is the National Health Accounts of the Centers for Medicare and Medicaid Services (CMS, formerly the Health Care Financing Administration). The NMES expenditure categories are from NMES expenditure data previously released on Public Use Tape 18 (Agency for Health Care Policy and Research, 1993).

The calibrated amounts (cal) represent 1987 estimates of National Health Expenditures from CMS by service type and payment source adjusted for a NMES population (Appendix B and Figure 1). The uncalibrated counterparts (uncal) are the 1987 NMES estimates. Calibration factors are defined as the ratio of the calibrated (adjusted NHA) amount to the uncalibrated (NMES) amount.

For the projected NMES data, calibration factors are derived by comparing adjusted NHA expenditures by service type and payment source for the future year to corresponding NMES estimates based on a reweighted NMES population for the same year (see text).

**Source:** Center for Cost and Financing Studies, Agency for Healthcare Research and Quality.

After adjustments were made to the NHA data (described in the next section, Appendix B, and Figure 1), comparable NHA amounts for each corresponding collapsed expenditure/payment source category were constructed.[8] Next, per capita NMES and per capita NHA expenditure/payment source entries were constructed for each cell of the matrix. Then, per capita NHA amounts were divided by reweighted per capita NMES amounts for each cell of the matrix to produce the 30 alignment factors for a given projection year. The 30 alignment factors for 1987 are shown in Table 3.

A given expenditure/payment source variable among the 144 such variables on the projected data sets (16 expenditure categories by 9 payment source categories) is "projected" to a future year by multiplying the original variable by the appropriate alignment factor and by the appropriate weight corresponding to the projection year and the person's demographic and insurance coverage characteristics. The numbers in parentheses in the first column of Table 1 provide the linkage needed to determine which of the collapsed expenditure categories (in the third column of Table 1) in the alignment matrix is used to align any of the 16 types of health expenditure variables on the projected data sets. There were seven collapsed categories from the third column of Table 1 because Categories 8 and 9 from the NHA (nursing home and other personal health expenditures) contain no NMES counterpart. For the alignment, Categories 2 (physician) and 4 (other professional) were combined to produce six final collapsed categories for the alignment. Thus, the alignment factor for the combined physician and other professional category was used to age health care expenditures for NMES expenditure Categories 2 and 4-9, as defined in the first column of Table 1.

As Table 2 makes clear, alignment within each expenditure category by source of payment was straightforward for the first seven NMES sources of payment (with Categories 5, 6, and 7 sharing the same "other government" factor). The last two categories, "other private" and "free from provider," were slightly

more complicated. The "other private" alignment factor was calculated as the weighted sum of the alignment factors for "self or family" and "private insurance," where the weights were their relative proportions for a given expenditure item. The "free from provider" factor used the average alignment factor across the five payment source types for a given expenditure category.

## Reconciling 1996 NMES and NHA Expenditure Estimates

The health expenditure target for a national sample of households in the civilian noninstitutionalized population differs from National Health Expenditures published in the National Health Accounts. Using 1996 as an example, Figure 1 shows the components of the NHA estimate of National Health Expenditures that had to be "backed out" to reach an appropriate alignment target for a household survey such as NMES. This section covers the rationale for the subtractions of expenditure data from the NHA. A more detailed discussion of this methodology appears in Appendix B. In particular, Appendix B provides more detail on how the expenditures removed from the NHA in section 3 of Figure 1 were allocated across payment source categories.

National Health Expenditures from the NHA in 1996 totaled $1,035.1 billion (Levit, Lazenby, Braden, et al., 1998). Included in this total are $127.9 billion for administration of health care services, insurance loading, government public health activities, and research and construction programs that are not included in NMES or in the NHA personal health expenditures. Subtracting these items reduces the NHA total to $907.2 billion, which represents the NHA estimate of personal health expenditures.[9]

A total of $106.1 billion in personal health expenditures for nursing home care and other personal health care services that were not covered by NMES were also removed from the NHA. Examples of "other personal health care services" not covered by NMES include health screening services, case management services, and home- and community-based waiver services.

Total subtractions from the NHA to this point equal $234.0 billion and reduce National Health Expenditures

[8]The blueprint for the adjustments to the NHA data was established by HCFA, now CMS (Office of the Actuary, 1991). A MEPS version of these adjustments to the NHA data was completed after the NMES version described in this report. The MEPS adjustments are described in Selden, Levit, Cohen, et al. (2000).

[9]The NHA estimates of National Health Expenditures were revised after this analysis (Heffler, Levit, Smith, et al., 2001).

to $801.1 billion. The remaining $801.1 billion includes expenditures for treating the acute care needs of residents of nursing homes and intermediate care facilities for the mentally retarded (ICF/MRs). These services are not covered by a household survey of the noninstitutionalized population. The estimate for the hospital and physician services used to treat the acute care needs of these institutionalized persons in 1996, $47.6 billion, was backed out from the NHA estimate of National Health Expenditures.

A total of $53.6 billion in expenditures for care in noncommunity hospitals that were outside the scope of the NMES hospital universe was also subtracted. This figure also includes the nonpatient revenues in short-term community hospitals that were in the NMES universe.

In addition, expenditures paid by "other private" sources were subtracted from each NHA service category. In the NHA, "other private" sources of payment represent primarily charity and philanthropy not directly attributable to services for specific patient events. There is no directly corresponding equivalent to these sources in NMES, so $11.5 billion for this source of payment had to be subtracted from NHA expenditures to perform the alignment. Likewise, all imputed expenditures from the "free from provider" payment source category were subtracted from NMES expenditures in each service category, because service values for this category are not imputed for health care services in the NHA.

The "other private" source of payment category in NMES was allocated between two sources of payment, "self or family" (out of pocket) and "private insurance," based on the relative proportion of each of these two payment sources in each type of service category in the NMES total health expenditure data. The "other private" payment source in NMES consists of payments made by automobile insurance, other unspecified types of insurance, and miscellaneous private sources. In the NHA, payments from these sources are allocated between "out of pocket" and "private insurance."

The portion of expenditures for nondurable medical goods in the NHA not attributable to prescription drug purchases primarily consists of over-the-counter medication purchases. These expenditure data were not collected in NMES. The entire NHA nondurable total for nonprescription drug purchases, $29.4 billion, was therefore subtracted from the NHA total.

It was not appropriate to align NMES to total adjusted NHA health care expenditures because NMES and the NHA are based on different populations. The aged NMES sample (Household Survey) for 1996 represents the 265.4 million persons in the U.S. civilian noninstitutionalized population. In contrast, the NHA includes several groups not represented in NMES, including residents of nursing homes, persons residing in personal care homes and ICF/MRs, persons in the Armed Forces, inmates of prisons and jails, persons in psychiatric hospitals, and residents of U.S. territories and possessions. CMS estimates that this non-NMES population totaled 10.1 million persons in 1996, with 2.2 million of them represented by persons in nursing homes and ICF/MRs. Health expenditures for these groups of the population that were not covered in NMES totaled $9.2 billion and were "implicitly" removed from the NHA total of $1,035.1 billion.

The additional subtractions from the NHA estimate of National Health Expenditures for 1996 totaled $151.3 billion. This produced a target National Health Expenditures total for 1996 of $649.8 billion after removing all non-NMES health expenditures from the NHA total. A more detailed discussion of this back-out procedure appears in Appendix B.

## NMES-NHA Alignment for 1987

The 1987 alignment factors for the NMES data in 1987 (Table 3) illustrate the discrepancy between estimates of national health expenditures by type of service and payment source from a nationally representative household survey and corresponding estimates from the National Health Accounts adjusted to a NMES population and data. Observed discrepancies are attributable to the alignment methodology and to sampling and nonsampling errors in both the NMES data and the measures used to construct the NHA estimates. For the overall population comparisons, an 8-percent differential between NMES estimates and the NHA (under the tenuous assumption that the NHA estimate has no sampling error) would be a lower bound of the margin of difference that could be detected at an alpha level of 0.05. For cell-specific comparisons based on smaller sample size constraints in NMES, only substantially larger margins of difference in estimates would be possible to detect as significant differences at the 0.05 level. The calibrated value (cal) in each cell is the adjusted NHA estimate, while the uncalibrated value

(uncal) is the corresponding NMES estimate. The calibration factor (cal factor) is the adjusted NHA estimate divided by the corresponding NMES estimate in each cell. Calibration factors greater than 1 indicate that the NMES estimate is less than the adjusted NHA estimate for a given type of service and payment source, while calibration factors less than 1 indicate that the NMES estimate exceeds the corresponding adjusted NHA estimate.

The ratio values referred to in the next paragraphs are the reciprocals of the calibration factor values in Table 3. Ratios are used here because the remaining text in this section focuses on how much the NMES estimate is above or below the corresponding NHA estimate. In contrast, for calibration purposes, the focus is on how much the NHA estimate is above or below the corresponding NMES estimate.

Overall, total personal health expenditures estimated from NMES exceed the corresponding adjusted NHA estimate by just over 8 percent (ratio = 1.0850). Based on the column totals for payment sources in Table 3, private insurance payments from the NMES data are only six-tenths of a percent lower than the corresponding adjusted NHA estimate (ratio = 0.9936). Out-of-pocket payments based on the NMES data exceed those from the NHA by 8-9 percent (ratio = 1.0855). The public payments estimated from NMES (for Medicare, Medicaid, and other government) all exceed the counterparts from the adjusted NHA data by considerably more than 8 percent.

Turning to the row totals for the expenditure categories in Table 3, hospital expenditures estimated with the NMES data exceed the corresponding total from the adjusted NHA data by slightly under 8 percent (ratio = 1.0770). The NMES estimate for expenditures on physician and other professional services exceeds the adjusted NHA equivalent by slightly over 8 percent (ratio = 1.0806). Prescription drugs and nondurables estimated from the NMES data are 3.6 percent lower than the adjusted NHA estimate (ratio = 0.9644). The NMES estimate of durables is 8.6 percent smaller than the adjusted NHA estimate (ratio = 0.9135), while the NMES home health expenditure estimate is nearly double that based on the NHA data (ratio = 1.883). A substantial component of this discrepancy results from the fact that only Medicare- and/or Medicaid-certified home health agencies are recognized in the NHA data. Also, hospital-based home health agencies are counted

in the NHA hospital services category rather than in the separate NHA home health expenditure amount (Selden, Levit, Cohen, et al., 2000).

Without discussing each of the cells in the interior of Table 3, suffice it to say that there is considerable variation within each row or column. This suggests that the aggregate relationship between NMES and NHA summarized by the marginal (row or column total) comparisons is not necessarily representative of the separate components in each row or column. The sometimes extreme differences between the estimates from the two sources call for further research into the methodologies used to construct health expenditures and payment sources in the National Health Accounts and in household survey data.

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# Appendix A. Control Variables for Population Aging

The first step in projecting National Medical Expenditure Survey (NMES) expenditure data was to project the NMES population. This was accomplished by reweighting the 1987 NMES sample so it represented populations for years after 1987. The reweighting was done in two stages. In the first stage, the NMES population was projected from 1987 to 1996 using population data from more recent household surveys. In the second stage, the aged 1996 NMES population was projected to each year after 1996 up to 2005 based on Census projections of the population.

The technical definitions and construction of the following person-level characteristics used to create the initial 1996 sample weight are provided in this appendix: age, race, sex, income relative to the poverty line, primary source of health insurance, employment status of the family head, region of residence, receipt of means-tested cash assistance, health maintenance organization (HMO) participation status, and Medicare/private insurance status. Variance estimates of the projected expenditures are discussed briefly at the end of this appendix.

After the 1996 sample weight was constructed, it was aged (based on changes in age, race, and sex) to create the final sample weight for the designated year (yy = 96, 97, ..., 05). All of the variables described in this appendix appeared on the publicly released projected expenditure files.

In several instances, NMES definitions of these population characteristics differed from their Current Population Survey (CPS) counterparts. For example, CPS insurance coverage variables reflect an annual time period (coverage from a particular source at any time during the year) rather than the time period covered by a NMES "round" (which averages about 3 months). Estimates of populations with these characteristics reflect the CPS definitions, because the data were reweighted to the CPS versions of these variables. For example, population projections of the number of unemployed persons should be interpreted as persons unemployed using the "full year" definition of unemployment in CPS, not the "part year" (or round) measure in NMES. Similarly, additional reweighting of the projected NMES data for Medicaid enrollees, HMO coverage, and employer-sponsored retirement coverage with respective Medicaid administrative data, NHIS data, and Medicare

Current Beneficiary Survey (MCBS) data "overrode" NMES definitions of these populations (and their counterparts, e.g., non-Medicaid coverage) with the way these populations are defined in these secondary data sources.

# Definitions of Control Variables

The partitioning of NMES records during the first step of the aging process (described in the Household Population Aging section) was defined by the following person-level variables.

*CASHASST:* Indicates participation in cash-assistance means-tested programs. It was created with NMES data concerning income from participation in Supplemental Security Income (SSI), Aid to Families with Dependent Children (AFDC), and other public assistance programs. This variable was formatted as:

  1 = SSI

  2 = AFDC or other public assistance

  3 = Neither

*NUHNSCOV:* Indicates primary source of health insurance. Private insurance coverage categories were constructed from NMES data collected from employers and insurance companies in the Health Insurance Plans Survey (HIPS). The HIPS data were imputed to persons who were eligible for HIPS but for whom data were not collected. Coverage from CHAMPUS (Armed-Forces-related coverage) and public health insurance was constructed by using data collected in the NMES Household Survey. Data on age, private insurance coverage, CHAMPUS coverage, Medicare participation, and Medicaid participation were based on the last round a person participated in NMES. Persons under age 65 were hierarchically coded into one of the first four categories unless they had both CHAMPUS and private coverage that was not employment related, in which case they were in Category 2. All persons age 65 and over were coded into Category 5. This variable was formatted as:

  1 = Private, employment-related or CHAMPUS

  2 = Private, not employment-related

  3 = Public (Medicare or Medicaid)

  4 = Uninsured

  5 = Age 65 or older

**POVSTALB:** Indicates family income relative to the poverty line. It was based on a NMES variable that classifies people as living in poor, near-poor, low income, middle income, high income, or negative income families. This NMES variable was based on the income of all related persons residing in the same household. This variable was formatted as:

1 = Less than 1.00 times poverty line

2 = 1.01 to 1.24 times poverty line

3 = 1.25 to 1.99 times poverty line

4 = 2.00 to 3.99 times poverty line

5 = 4.00 or more times poverty line

The families with negative income were included in Category 1.

**AGE3:** A three-category age variable based on age data from the last round a person participated in NMES. All records have a value of this variable, but it was used to post-stratify on age for persons identified as being on cash assistance (CASHASST = 1 or 2). This variable was formatted as:

1 = 0-17

2 = 18-64

3 = 65 or older

**AGE10:** A 10-category age variable based on age data from the last round a person participated in NMES. All records have a value of this variable, but it was used to post-stratify on age for persons not getting any cash assistance (CASHASST = 3). This variable was formatted as:

1 = 0-4

2 = 5-14

3 = 15-24

4 = 25-34

5 = 35-44

6 = 45-54

7 = 55-64

8 = 65-74

9 = 75-84

10 = 85 or older

**SEX:** Indicates sex as reported in NMES. This variable was formatted as:

1 = Male

2 = Female

**NEWRACE:** A person-level variable constructed to facilitate the post-stratification of the sampling weight by race and ethnicity considering three mutually exclusive classifications: Hispanic, black non-Hispanic, and other. This variable was formatted as:

1 = Hispanic

2 = Black non-Hispanic

3 = Other

**EMPFAMHD:** A constructed variable based solely on NMES Household Survey data which cross-classifies household-reported data on employer insurance premium contributions and employment status for the head (eldest person) in each family. Employment status was based on the survey week of the last round a person designated as the family head participated in NMES. In coding this variable, all family members were assigned the same category as the family head. This variable was formatted as:

1 = No job (last week)

2 = Has job and employer makes health insurance contributions

3 = Other

**REGION:** Indicates the Census region (Northeast, Midwest, South, or West) that persons resided in as of the last round they participated in NMES. This variable was formatted as:

1 = Northeast

2 = Midwest

3 = South

4 = West

The NMES variables used in the adjustment of the 1996 sample weight for the underreporting of AFDC, SSI, and Medicaid participation on the March 1997 CPS were REGION and the following.

**CASHAS36:** A hierarchical variable that indicates if a person participated in SSI, AFDC, or other Medicaid (noncash) at any point in NMES. It was created with NMES data on income from participation in SSI, income from participation in AFDC, other Medicaid

participation (noncash), age, and region of persons in the last round they participated in the survey. This variable was formatted as:

1 = Cash, AFDC, <18, Northeast

2 = Cash, AFDC, 18+, Northeast

3 = Cash, SSI, <65, Northeast

4 = Cash, SSI, 65+, Northeast

5 = Noncash, <21, Northeast

6 = Noncash, 21-64, Northeast

7 = Noncash, 65+, Northeast

8 = Other, <65, Northeast

9 = Other, 65+, Northeast

10 = Cash, AFDC, <18, Midwest

11 = Cash, AFDC, 18+, Midwest

12 = Cash, SSI, <65, Midwest

13 = Cash, SSI, 65+, Midwest

14 = Noncash, <21, Midwest

15 = Noncash, 21-64, Midwest

16 = Noncash, 65+, Midwest

17 = Other, <65, Midwest

18 = Other, 65+, Midwest

19 = Cash, AFDC, <18, South

20 = Cash, AFDC, 18+, South

21 = Cash, SSI, <65, South

22 = Cash, SSI, 65+, South

23 = Noncash, <21, South

24 = Noncash, 21-64, South

25 = Noncash, 65+, South

26 = Other, <65, South

27 = Other, 65+, South

28 = Cash, AFDC, <18, West

29 = Cash, AFDC, 18+, West

30 = Cash, SSI, <65, West

31 = Cash, SSI, 65+, West

32 = Noncash, <21, West

33 = Noncash, 21-64, West

34 = Noncash, 65+, West

35 = Other, <65, West

36 = Other, 65+, West

An interim 1996 sample weight was created by partitioning the population on the file into the 36 categories in CASHAS36. The sum of the initial 1996 sample weight for the people in these categories was calculated. The total number of people in each category as reported on administrative records was divided by the sum in that category. Each person's initial 1996 sample weight was multiplied by the ratio from this CASHAS36 category to create the interim 1996 sample weight.

Next, this interim 1996 sample weight was adjusted to match HMO enrollment of persons under age 65 with private insurance as reported in the 1995 National Health Interview Survey (NHIS). In both NMES and NHIS, an HMO was defined as either a group or staff model prepaid health plan or an independent practice association. The population under 65 with private insurance was partitioned by the same personal characteristics used in the creation of the initial 1996 sample weight plus the following.

*LASTHMOX:* Indicates if people were covered in their last round of NMES eligibility by a private health insurance plan that was classified as an HMO based on health insurance plan abstraction (HIPA) data. The NMES HIPA data consisted of detailed coverage parameters such as deductibles, copayments, and coinsurance rates that were abstracted from private health insurance plan booklets of NMES policyholders. The LASTHMOX variable was imputed to persons eligible for HIPA but for whom data were not collected due to sampling nonresponse. This variable was formatted as:

0 = No

1 = Yes

The people under age 65 with private insurance had their weight values adjusted according to these partitions. The people outside this population did not. Charges imputed to health services consumed by the HMO population based on charges by the fee-for-service population in the 1987 NMES were carried forward in the aged NMES database.

Ultimately, the weights for the Medicare population, age 65 and over were adjusted so that the proportions of people with no insurance other than Medicare, other employment-based insurance, and other individually

purchased insurance coverage matched the same proportions from MCBS. The Medicare population was partitioned by the following characteristics.

*ANYMCARE:* Indicates whether people age 65 and over had Medicare coverage only, Medicare and Medicaid coverage, Medicare coverage with employment-sponsored private insurance, Medicare coverage with other private insurance, or no Medicare coverage. Only NMES Household Survey data were used to construct this variable. A person was considered to be covered by Medicare if the NMES Medicare participation variable indicates Medicare coverage in any round of the survey.

If people were not 65 years of age or over during the last round they participated in the survey, they were assigned to Category – 1. If people were classified as having Medicare coverage and had Medicaid or other public coverage on the interview date in any round they participated in NMES, regardless of any other coverage, they were assigned to Category 1. If they were classified as being covered by Medicare and reported having group coverage through their employer or union in any round of NMES, they were assigned to Category 2. If they were classified as being covered by Medicare and, in any round of NMES, had group coverage that was not through their employer or union or had nongroup coverage, they were assigned to Category 3. If they were classified as being covered by Medicare and had no other coverage, they were assigned to Category 4. If they were not classified as being covered by Medicare, they were assigned to Category 5. This hierarchical variable was formatted as:

– 1 = Inapplicable (under age 65)

1 = Medicare and Medicaid

2 = Medicare and employer or union group insurance

3 = Medicare and individually purchased insurance

4 = Medicare only

5 = No Medicare

Finally, the weight was adjusted to represent the 1996 population rather than the March 1997 population from CPS to create the final version of the 1996 sample weight. The entire population was partitioned into one of 60 categories defined by SEX, NEWRACE, and AGE15.

*AGE15:* A 15-category age variable based on age data from the last round a person participated in NMES. This variable was formatted as:

1 = 0

2 = 1-4

3 = 5-9

4 = 10-14

5 = 15-19

6 = 20-24

7 = 25-29

8 = 30-34

9 = 35-44

10 = 45-54

11 = 55-59

12 = 60-64

13 = 65-69

14 = 70-74

15 = 75 or older

## Variance Estimation

It is possible to estimate the variances associated with projected estimates that are a consequence of the underlying sample design of NMES data. Variance estimates of descriptive statistics derived from these data that are made using conventional procedures that focus on measuring sampling variability generally understate the overall variance. This is a consequence of the influence of additional sources of error introduced to NMES data through aging and alignment to external data sources. The variance estimates attributable to NMES sample design can be used instead as lower bound guideposts in the absence of more complex variance expressions that account for additional sources of uncertainty introduced by the projection methodology.

# Appendix B. Reconciling NHA and NMES Expenditure Data

The material in this appendix supplements the material in the body of this report on the National Health Accounts (NHA) alignment procedure. The "back-out" of health expenditures from the NHA was implemented for each year from 1996 through 2005 with spreadsheet software. A description of the methodology for the subtractions from NHA, totaling $151.3 billion in 1996 (Section 3 of Figure 1), follows. A description of how these subtracted amounts were allocated across the various payment sources in the spreadsheet software is included as well.

The general approach adopted was to first remove from the NHA the expenditures of the population groups not covered in the National Medical Expenditure Survey (NMES) that were assumed to be atypical compared to the average expenditures of the NMES population. The health care expenditures of persons not sampled in NMES because they were in nursing homes or intermediate care facilities for the mentally retarded (ICF/MRs) were assumed to be atypical and were thus removed by a series of steps outlined below. It was unnecessary to remove expenditures of the non-NMES population groups assumed not to be atypical because the alignment of NMES to adjusted NHA expenditures was done on a per capita basis. Figure 1 shows that the alignment implicitly removed $9.2 billion from the NHA for non-NMES populations, although this removal was not explicitly carried out in the spreadsheet software except for the nursing home and ICF/MR populations. It was assumed that the expenditures of all other populations excluded from NMES had average expenditures the same as those of the sampled NMES population. Thus by inflating per capita expenditures to a NMES population, rather than an NHA population, the expenditures of these other excluded populations were implicitly excluded.

## Adjustments to NHA Hospital Expenditures

First, a series of steps was implemented to remove from total NHA hospital expenditures (1) the acute care hospital expenditures of the nursing home and ICF/MR population, (2) the hospital expenditures of non-short-term noncommunity hospitals outside the NMES sampling frame, and (3) the nonpatient revenues of short-term community hospitals within the NMES sampling frame. The estimation procedure for the amounts backed out from total NHA hospital expenditures and payment sources is described in the following four steps.

### Step 1: Estimating privately paid acute care hospital expenditures for the nursing home and ICF/MR population

Acute care hospital expenditures for the NHA population in nursing homes or ICF/MR facilities that were paid from private sources, either from private health insurance or by self or family (out-of-pocket) payments, were estimated to be $0.4 billion in 1987. It was assumed that the remaining non-NMES population in the NHA had no hospital expenditures paid from these private sources. The $0.4 billion represents the product of the estimated number of hospital admissions for this population and estimated private payments per admission. It was inflated to $0.7 billion in 1996 by using the Medical Care component of the Consumer Price Index (CPI-M). It was then inflated to years 1997 through 2005 by using the 1987-96 annual average value of the CPI-M for the appropriate number of years.

The fraction of these expenditures paid by private health insurance (or paid out of pocket) was estimated by the ratio of NHA hospital expenditures paid by private insurance (or paid out of pocket) to NHA hospital expenditures paid from private sources (combined private health insurance and out of pocket) for a given year.

To obtain an estimate of NHA hospital expenditures for the NMES population that were paid by private health insurance, the above ratio was multiplied by $0.7 billion and the result subtracted from the total NHA hospital expenditures paid by private insurance. A similar procedure was used to estimate out-of-pocket hospital expenses for the NMES population. To summarize:

NHA hospital out of pocket (net of the nursing home and ICF/MR population) =

Total NHA hospital out of pocket –

estimated hospital out of pocket of the nursing home and ICF/MR population

NHA hospital private health insurance (net of the nursing home and ICF/MR population) =

Total NHA hospital private health insurance –

estimated hospital private health insurance of the nursing home and ICF/MR population

## Step 2: Estimating total acute care hospital expenditures for the nursing home and ICF/MR population

Before adjusting NHA Medicare, Medicaid, and other government hospital expenditures for the nursing home and ICF/MR populations, total acute care hospital expenditures for the nursing home and ICF/MR populations were first estimated. Spending per capita on acute care hospital and physician services by the nursing home population was estimated by using NMES mean hospital and physician expenditures of noninstitutionalized persons who were age 65 and over, and who had limitations in three or more activities of daily living. This value of $11,000 was aged from 1987 to years 1996 through 2005 by using the 1987-96 average annual CPI-M.

A per capita value for acute care hospital and physician services for the ICF/MR population was estimated by using NMES mean total health care expenditures for the entire civilian community population that had any medical expenditures. This value of $1,800 in 1987 was also inflated by the 1987-96 average annual CPI-M to estimate expenditures in the years 1996 through 2005. (Using the overall mean for persons with any medical expenditures may underestimate acute care expenses for the ICF/MR population, but it is not likely to affect the results significantly because this population accounted for only about 15 percent of the combined nursing home and ICF/MR population in 1996.)

Total acute care hospital and physician expenditures for the nursing home and ICF/MR population in a given year were obtained by multiplying the nursing home estimate from NMES by the nursing home population, multiplying the ICF/MR estimate from NMES by the ICF/MR population, and then taking the sum of the two products. The populations for these two groups were estimated by applying recent growth rates to reported levels. The portion of the total acute care hospital and physician expenditures for this combined population

allocated to hospital expenditures was estimated by multiplying the total by the fraction of total NHA hospital and physician expenditures that were attributed to hospitals only. However, about 15 percent of NHA hospital expenditures were from hospitals outside the scope of NMES and revenue sources not included in NMES. (See Step 3 of this section.) Therefore, the total NHA hospital expenditures used in both the numerator and denominator of this adjustment factor were reduced by 15 percent.

## Step 3: Estimating hospital expenditures of non-short-term noncommunity hospitals and nonpatient revenue of short-term community hospitals

The NMES universe of hospitals includes only short-term community hospitals, and NMES expenditures include only patient revenues in these hospitals. Data on nonpatient revenues, such as parking fees or State and local subsidy payments, were not included in NMES. The NHA, in contrast, include Federal hospitals, psychiatric hospitals, and other long-term hospitals and include all sources of revenue received by these and other hospitals. These non-NMES hospital expenditures were estimated to represent $29.1 billion of the $194.1 billion in total NHA hospital expenditures in 1987. For years after 1987, these expenditures were assumed to represent the same proportion of total NHA hospital expenditures as in 1987.

Neither expenditures for noncommunity hospitals excluded from the NMES universe nor nonpatient revenues of community hospitals were assumed to be financed from private sources (either by private health insurance or family/self payments). These expenditures were instead assumed to be financed solely by public sources (Medicare, Medicaid, and other government).

## Step 4: Removing publicly financed non-NMES hospital expenditures and nonpatient revenues from NHA Medicare, Medicaid, and other public sources

Subtracting the total private acute care expenditures of the nursing home and ICF/MR population in Step 1 of this section from the total acute care hospital

expenditures for this population in Step 2 of this section produces the publicly financed portion of acute care hospital expenditures for this population. Combining this with Step 3 of this section, the publicly financed estimated hospital expenditures of non-NMES hospitals and the nonpatient revenues of NMES hospitals, produces a total publicly paid hospital back-out amount (PHBACK). Subtracting this amount from the NHA total public payments to hospitals (PHNHA) adjusts this total for PHBACK. The ratio of (PHNHA – PHBACK) to PHNHA produces an adjustment factor PHADJUST.

Medicare, Medicaid, and other public payments to hospitals in the NHA (which sum to PHNHA) are each multiplied by PHADJUST to produce estimates of each payment source after removing the corresponding public payments for each source attributed to the acute hospital care of the nursing home and ICF/MR population, the expenditures of non-NMES hospitals, and the nonpatient revenues of NMES hospitals.

# Adjustments to NHA Physician Expenditures

Adjustments made to the NHA physician service category to remove physician payments for the acute care of the nursing home and ICF/MR population were similar to those described for the hospital service category, with the following exceptions.

### Step 1: Estimating privately paid acute care physician expenditures for the nursing home and ICF/MR population

Physician expenditures for the nursing home and ICF/MR population paid from private sources (out of pocket or by private health insurance) were estimated by multiplying the previously estimated value for hospitals from Step 1 of the preceding section (Adjustments to NHA Hospital Expenditures) by the ratio of total NHA physician expenditures to total NHA hospital expenditures in a given year. The fraction of these expenditures paid by each separate private source was estimated by the ratio of NHA physician expenditures paid by each source (private health insurance or out of pocket) to NHA physician expenditures paid from private sources for a given year.

### Step 2: Estimating total acute care physician expenditures for the nursing home and ICF/MR population

The physician expenditure value for the nursing home and ICF/MR population was estimated by multiplying estimated hospital and physician expenditures for this population from Step 2 of the hospital section, above, by the fraction of total NHA hospital and physician expenditures dedicated to physicians only.

### Step 3: Removing NHA physician expenditures paid by other private sources

Physician expenditures paid by other private sources in the NHA were also subtracted from NHA physician expenditures. In the NHA, other private sources of payment represent primarily charity and philanthropy not directly attributable to services for specific patient and other nonpatient revenues. There is no directly corresponding equivalent to these sources in NMES, so this source of payment had to be subtracted from NHA expenditures to perform the alignment.

### Step 4: Removing publicly financed acute care physician expenditures from NHA Medicare, Medicaid, and other public sources

This adjustment was similar to Step 4 in the hospital section, above. Each of the public sources (Medicare, Medicaid, and other public) was multiplied by an adjustment factor (PPADJUST) that was the ratio of [NHA physician expenditures paid by public sources (PPNHA) minus acute care physician expenditures of the nursing home and ICF/MR population paid by public sources (PPBACK)] to PPNHA.

# Adjustments to NHA Dental Expenditures

The procedure for estimating dental expenditures of the nursing home and ICF/MR population, and for allocating these expenditures across payment sources, differed from the procedures for hospital and physician expenditures. Dental expenditures in NHA categorized

as paid by other private sources were also removed from the NHA total.

### Step 1: Estimating total dental expenditures for the nursing home and ICF/MR populations

The total dental expenditures of the nursing home and ICF/MR populations were estimated by multiplying total NHA dental expenditures by the fraction of the NHA population that was in nursing homes and ICF/MRs. These values were then subtracted from NHA total dental expenditures to obtain a net value. The reported NHA value of dental expenditures for each of the five sources of payment was multiplied by the ratio of the value of NHA dental expenditures (net of the nursing home and ICF/MR populations) to the NHA total value of dental expenditures.

### Step 2: Removing NHA dental expenditures paid by other private sources

Dental expenditures paid by other private sources were also subtracted from NHA dental expenditures.

## Adjustments to NHA Other Professional Health Care Expenditures

Adjustments to NHA other professional expenditures were similar to the NHA physician expenditure adjustments documented previously, with the following exceptions.

### Step 1: Estimating privately paid acute care other professional expenditures for the nursing home and ICF/MR population

Other professional health care expenditures for the nursing home and ICF/MR population paid by private sources (private health insurance or out of pocket) were estimated by multiplying the aged NMES hospital private-pay estimate for this population from Step 1 of the Adjustments to NHA Hospital Expenditures section by the ratio of total NHA other professional health care expenditures to total NHA hospital expenditures in a given year. It is assumed that the ratio of other professional expenditures to hospital expenditures is the same in the aged NMES population as in the excluded population. The fraction of these expenditures paid by each separate private source was estimated by the ratio of NHA other professional expenditures paid by each respective source (private health insurance or out of pocket) to NHA other professional expenditures paid from private sources for a given year.

### Step 2: Estimating total acute care other professional expenditures for the nursing home and ICF/MR population

The other professional expenditure value for the nursing home and ICF/MR population was estimated by multiplying the total NHA other professional health care value by the fraction of NHA total hospital and physician expenditures attributed to the nursing home and ICF/MR population.

### Step 3: Removing NHA other professional expenditures paid by other private sources

Other professional expenditures paid by other private sources were also subtracted from NHA other professional expenditures. The rationale for this adjustment is explained in Step 3 of the Adjustments to NHA Physician Expenditures section.

### Step 4: Removing publicly financed acute care other professional expenditures from NHA Medicare, Medicaid, and other public sources

This adjustment was similar to Step 4 in the sections on adjustments to hospital expenditures and adjustments to physician expenditures. Each of the public sources (Medicare, Medicaid, and other public) was multiplied by an adjustment factor (POPADJUST) that was the ratio of [NHA other professional expenditures paid by public sources (POPNHA) minus other professional acute care expenditures of the nursing home and ICF/MR population paid by public sources (POPBACK)] to POPNHA.

## Adjustments to NHA Home Health Expenditures

Home health expenditures paid by other private sources in the NHA were subtracted from NHA home health expenditures. No other adjustments were made to home health expenditures in the NHA prior to the alignment of reweighted NMES expenditures to NHA targets.

## Adjustments to NHA Drugs and Nondurables Expenditures

The NHA nondurable expenditures include expenditures for prescription drugs, nonprescription drugs, and other nondurables. The portion of NHA nondurable expenditures not covering prescription drugs was completely removed from NHA nondurable expenditures. NMES did not collect data on over-the-counter medications, and most other nonprescription nondurables were out of scope for NMES. The NHA prescription drug expenditures were, however, adjusted for estimated purchases by the nursing home and ICF/MR populations.[10]

### Step 1: Estimating total prescription expenditures for the nursing home and ICF/MR populations

The total expenditures on prescription drugs for the nursing home and ICF/MR population were estimated by multiplying total NHA prescription drug expenditures by the ratio of nursing home and ICF/MR hospital and physician expenditures to total NHA hospital and physician expenditures. This result was subtracted from total prescription drug expenditures to obtain a net NHA prescription expenditure value.

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[10]It is likely that this adjustment overcorrects for the prescription purchases of the nursing home and ICF/MR population. Many residents may have purchased their prescription drugs from the institution in which they resided rather than directly from retail pharmacy outlets. If so, then some portion of these expenditures had already been removed from National Health Expenditures with the removal of nursing home expenditures and non-NMES hospital expenditures.

### Step 2: Removing prescription drug expenditures of the nursing home and ICF/MR populations from each private and public payment source

The reported NHA value of prescription drug expenditures for each of the five sources of payment was multiplied by the ratio of the value of NHA prescription drug expenditures (net of the nursing home and ICF/MR populations, from Step 1 of this section) to the NHA total value of prescription drug expenditures.

## Adjustments to NHA Durable Medical Goods Expenditures

Adjustments to NHA durable medical goods expenditures were similar to the NHA physician expenditure adjustments documented above, with the following exceptions.

### Step 1: Estimating privately paid durable medical goods expenditures of the nursing home and ICF/MR populations.

The durable medical goods expenditures for the nursing home and ICF/MR population paid by private sources (private health insurance or out of pocket) were estimated by multiplying the privately paid hospital expenditures for this population (from Step 1 of the Adjustments to NHA Hospital Expenditures section) by the ratio of total NHA durable medical goods expenditures to total NHA hospital expenditures.

The fraction of these expenditures paid by each separate private source was estimated by the ratio of NHA durable goods expenditures paid by each source (private health insurance or out of pocket) to NHA durable goods expenditures paid from private sources for a given year.

### Step 2: Estimating total durable medical goods expenditures for the nursing home and ICF/MR populations

Total expenditures on durable medical goods for the nursing home and ICF/MR populations were estimated by multiplying total NHA durable medical goods expenditures by the fraction of total hospital and physician expenditures applicable to the nursing home

and ICF/MR population. (The numerator of this fraction is produced in Step 2 of the Adjustments to NHA Hospital Expenditures section.)

### Step 3: Removing NHA durable medical goods expenditures paid by other private sources

There were no other private source payments for durable medical goods expenditures in the National Health Accounts.

### Step 4: Removing publicly financed durable medical goods expenditures for the nursing home and ICF/MR populations

This adjustment was similar to Step 4 in the sections on adjustments to hospital, physician, and other professional expenditures. Each public source (Medicare, Medicaid, and other public) was multiplied by an adjustment factor that was the ratio of [NHA durable medical goods expenditures paid by public sources (PDNHA) minus durable medical goods expenditures of the nursing home and ICF/MR population paid by public sources (PDBACK)] to PDNHA.

# Per Capita Values

Per capita expenditure values were calculated for each source of payment in each service category using the following guidelines for the per capita values based on NHA data.

The population used to calculate per capita values for each source of payment was the same across all service categories but typically differed between the per capita values based on NMES and NHA data and differed across payment source categories.

A low percentage of the medical services utilized by the non-NMES population was assumed to be paid by private health insurance or out of pocket. Therefore, the entire non-NMES population was excluded from the calculation of per capita expenditures in the out-of-pocket and private health insurance sources of payment. The nursing home and ICF/MR populations were assumed to have a high rate of utilization of services, and a relatively high percentage of these services was assumed to be paid by Medicare and Medicaid. The rate of utilization for the remaining non-NMES population was presumed to be about equal to the rate for the NMES population. Therefore, only the individuals in nursing homes and ICF/MRs were excluded from NHA per capita calculations in the Medicare and Medicaid sources of payment. The population used in the other government payment source category was the average of these two per capita adjustments. This is because the expenditures for the non-NMES population were assumed to be paid by other government sources, but the rate at which the non-NMES population received assistance from other government sources was assumed to be lower than the rate for the NMES population.[11]

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[11]The aging process employed was relatively insensitive to alternative assumptions underlying the method utilized for obtaining per capita amounts.